

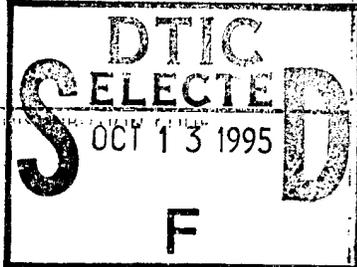
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Final Technical Report
AASERT Award F49620-92-J-0312

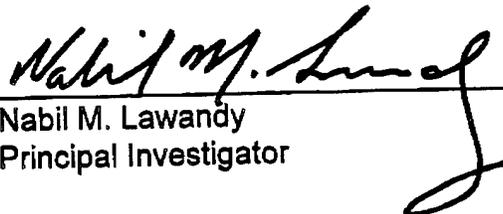
Principal Investigator: **Nabil M. Lawandy**
Professor of Engineering and Physics

Students Supported: **Jae H. Kyung**
Guy M. Beadie, Ph.D.

Date: **September 25, 1995**

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Submitted:


Nabil M. Lawandy
Principal Investigator

Project Result Summary:

The two main focus areas of research augmentation under the AASERT grant were:

- (1) Development of a maskless glass based patterning technology, and
- (2) Development of a single step laser fabrication technology for making refractive microlenses.

The first project was undertaken by Jae H. Kyung, a fourth-year Physics graduate student, and is currently ongoing. This work has resulted in three papers in *Optics Letters* and four conference presentations. In addition, a broad patent disclosure was made to Brown University for this invention.

The second project was the final portion of Guy Beadie's thesis work. This work will appear in an upcoming issue of *Optics Letters* and will be highlighted in *Laser Focus World*, in the October issue. Guy Beadie received his Ph.D. in May, 1995, and is currently continuing this work at the Naval Research Laboratory Laser Physics Branch, under the supervision of Dr. Barry Feldman. This work has also resulted in a patent application and is currently being out-licensed from Brown University by a public company in the laser materials processing area.

List of Publications Citing AASERT Funding

- Beadie, G., Sauvain, E., Gomes, A. S. L., and Lawandy, N. M., "Temperature Dependence of Carrier Dynamics in $\text{CdS}_x\text{Se}_{1-x}$ Doped Glasses Studied by Two Color Picosecond Spectroscopy," *Journal of Luminescence* **60&61**, 731 (1994).
- Beadie, G., Sauvain, E., Gomes, A. S. L., and Lawandy, N. M., "Temperature Dependence of Carrier Relaxation in Semiconductor Doped Glasses," *Physical Review B* **51(4)**, 2180 (1995).
- Beadie, G., Sauvain, E., and Lawandy, N. M., "Low Dimensional Dispersive Transport at Nanocrystal Interfaces," *Solid State Communications* **94(9)**, 709 (1995).
- Beadie, G. M., and Lawandy, N. M., "Single-Step Laser Fabrication of Refractive Microlenses in Semiconductor-Doped Glasses," to appear in the November, 1995, issue of *Optics Letters*.
- Sauvain, E., Kyung, Jae H., and Lawandy, N. M., "Multiphoton Micrometer-Scale Photoetching in Silicate-Based Glasses," *Optics Letters* **20(3)**, 243 (1995).
- Kyung, Jae H., and Lawandy, N. M., "Maskless Photo-Induced Selective Etching for Glass Based Microtechnology Applications," submitted to *Optics Letters*, September 1995.
- Kyung, Jae H., and Lawandy, N. M., "Direct Measurement of Photo-Induced Charge Distribution Responsible for Second Harmonic Generation in Glasses," submitted to *Optics Letters*, August 1995.
- Kyung, Jae H., and Lawandy, N. M., "UV Light Induced Selective Etching in Borosilicate Glasses for Micropatterning," submitted to *Electronics Letters*, September 1995.

Conference Presentations

- Beadie, G., Sauvain, E., Gomes, A. S. L., and Lawandy, N. M., "Temperature Dependence of Carrier Dynamics in $\text{CdS}_x\text{Se}_{1-x}$ Doped Glasses Studied by Two Color Picosecond Spectroscopy," Paper No. A-00062, ILS/OSA, Toronto, Canada, 1993.
- Beadie, G., Sauvain, E., Gomes, A. S. L., and Lawandy, N. M., "Temperature Dependence of Carrier Dynamics in $\text{CdS}_x\text{Se}_{1-x}$ Doped Glasses Studied by Two Color Picosecond Spectroscopy," International Conference on Luminescence, Storrs, CT, August 9-13, 1993.
- Sauvain, E., Kyung, Jae H., and Lawandy, N. M., "Photoinduced Micron Scale Maskless Etching in Transparent Glasses," Paper No. PD2.4, IEEE-LEOS Annual Meeting, Boston, MA, October 31 - November 3, 1994.
- Kyung, Jae H., Sauvain, E., and Lawandy, N. M., "Micron-Scale Maskless Photoetching in Transparent Borosilicate Glasses," Paper No. MP2, Optical Society of America Annual Meeting/ILS-X, Dallas, TX, October 2-7, 1994.

Kyung, Jae H., Lawandy, N. M., and Sauvain, E., "Bichromatic Harmonic Optical-Field Effects in the Photoinduced Etching of Borosilicate Glasses," Paper No. QThA4, CLEO '95, Baltimore, MD, May 21-26, 1995.

Beadie, G., Vartak, S. D., Kyung, Jae H., and Lawandy, N. M., "Microlenses and Microlens Arrays Fabricated by Laser Heating of Semiconductor-Doped Glasses," Paper No. CTuK6, CLEO '95, Baltimore, MD, May 21-26, 1995.

Kyung, Jae H., and Lawandy, N. M., "Measurement of Photo-Induced Charge Distribution in Seeded Second Harmonic Generation by Charge-Selective Etching in Glasses," OSA Topical Meeting: Photosensitivity and Quadratic Nonlinearity in Glass Waveguides '95, Portland, OR, September 9-11, 1995.